

*IPC Training*

27 February 1970

MEMORANDUM FOR: Information Processing Coordinators

SUBJECT : Training in Decision Analysis

1. For the past year, the OCS Training Staff has been exploring external courses providing an orientation to management science for key managers.

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3. This proposal is based on our interest in a program which will orient the senior level management group in decision analysis and the application of those modern quantitative techniques to some types of decision making problems we encounter. The firm has proposed to modify existing cases and problems used in the course and develop new cases which will illustrate the basic concepts of management science in a governmental environment. A solid foundation for applications of the scientific techniques to management problems requires an orientation to quantitative decision analysis.

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ment groups throughout the world. During the past six years, this program has been given over eighty times to the management levels of many of the largest corporations. The program has taken the form of special "private" seminars, modified to their needs and given in their facilities. In addition, public seminars on the use

Subject: Training in Decision Analysis

- 2 -

of management science/operations research techniques in management have been given since 1957 to executives of most of the major corporations and governmental agencies. Over two thousand executives have participated.

5. A preliminary outline and description of the subject matter of the program is attached. The cost of this three-day program for up to 30 students would be about \$7200. I would appreciate your comments on the above proposal.

6. I want to emphasize that I am not trying to sell this kind of educational program, nor am I sure that OCS should be taking the initiative here. But I believe it is appropriate to raise the issue for discussion.

/S/

STATINTL

[REDACTED]  
Information Processing Coordinator  
Science and Technology

cc: Chairman, IP Board  
C/IPS/OPPB  
[REDACTED] IPS/OPPB  
C/ATS/OCS

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## THE GOVERNMENT EXECUTIVE AND MANAGEMENT SCIENCE

Proposed Content and ScheduleFirst Day

	<u>Topic</u>	<u>Materials</u>
a.m.	<ul style="list-style-type: none"> <li>• Orientation: Mathematical Concepts for Decision Making</li> <li>• Framework for Decision Making -- Use of Decision Trees</li> </ul>	Technitronics -- Simple Decision Tree case
p.m.	<ul style="list-style-type: none"> <li>• Complex Decision Trees -- Value of Information</li> </ul>	Contract Bidding Case
Evening	<ul style="list-style-type: none"> <li>• Read "Simulation and Decision Theory" and "Size of Work Force" Case</li> </ul>	Article and Case

Second Day

a.m.	<ul style="list-style-type: none"> <li>• Introduction to Simulation and Decision Theory</li> <li>• Computer Application Workshop-- Simulation Techniques</li> </ul>	"Size of Work Force" Case
p.m.	<ul style="list-style-type: none"> <li>• Using Simulation for Complex Decision Problems</li> <li>• Computer Application Workshop-- Techniques for Complex Problems</li> </ul>	Project Cost and Scheduling Case
Evening	<ul style="list-style-type: none"> <li>• Read Note on Linear Programming</li> </ul>	

Third Day

a.m.	<ul style="list-style-type: none"> <li>• Linear Programming -- Choosing the Best Allocation of a Limited Production Resource</li> <li>• Computer Application Workshop -- Solving the Allocation Problem Linear Programming as a Planning Tool</li> </ul>	Sherman Case
p.m.	<ul style="list-style-type: none"> <li>• Computer Application Workshop -- More Complex Linear Programming Problems</li> <li>• Review of Concepts, their Applications, and Problems of Implementation</li> </ul>	Project Resource Allocation Case

DESCRIPTION OF CASE MATERIALS1. Technitronics -- Simple Decision Tree Case

The Technitronics case presents a short, well-defined management situation. It demonstrates the process of laying out alternative courses of action in the form of a decision tree for the analysis of problems involving uncertainty. Both structuring act forks and event forks are examined in the process of diagramming the tree. The case also illustrates the concept of dependent event probabilities, and methods for structuring and assessing conditionalities. This case is an introduction to decision trees and permits an easy evaluation of a tree by the reader/participant. In addition, the case is structured around a government subcontractor and therefore directly relevant to a government-oriented seminar.

2. Contract Bidding/Value of Information Case

The Contract Bidding Case is a rework of a case currently used in our commercial seminars. It illustrates a more complex act-event tree with several inter-related events. The case deals with the concept of continuous events, illustrating the problem of evaluating a tree with many possible end positions. Three short supplements are added to illustrate three important uses of this type of analysis:

- a. An "Expected value of information" supplement addresses the problem of evaluating the worth of more information about uncertainties involved in a decision prior to making the decision.
- b. A second supplement demonstrates how a basic tree can be expanded to include larger considerations in the analysis of a problem.
- c. A third supplement, which covers restructuring a basic tree for the analysis of specific alternatives, demonstrates the usefulness of the tree approach in answering varying types of management questions.

This Contract Bidding Case is applicable to many internal management situations in government agencies, and is an excellent case to cover detailed analysis of the usefulness of decision trees for attacking problems under uncertainty.

3. Size of Work Force Case

A common problem in administration is that of determining the best size of a work force to meet either (a) a

variable work load or (b) a fixed work load but subject to varying degrees of absenteeism. In the first situation, where the amount of work to be processed is subject to a variety of random variations, we are interested in minimizing the total payroll associated costs of processing the variable work load. In the second case we are concerned about the size of a work pool to fill in due to the opposing costs of idle time and unprocessed work. This case is an introduction to simulation and decision theory which illustrates the concepts of a payoff matrix, probabilities, and expected costs.

#### 4. Project Cost and Scheduling Case

Many decision making situations found within government agencies and government related commercial enterprises involve project management problems -- problems of managing cost, schedule, and technology to complete one or more definable end products or projects. This case illustrates how a moderately complex time shared simulation model can help the manager address several problems arising from the project management situation. Specifically, the case demonstrates how cost and schedule can be interrelated, in a consistent manner for both the initial assessment of the expected project outcome and the on-going management of a project. The case will be about a government-oriented management situation and will deal with a specific problem for which the reader/participant can structure a straight forward method of solution.

#### 5. Sherman Case

Sherman Motor Company is a specialized truck manufacturer with four manufacturing operations. It is an excellent case for teaching basic linear programming concepts since it is small, relatively simple, graphical, and yet realistically difficult such that the solution is not obvious. The problem involves determination of the optimal product mix subject to capacity restrictions on the manufacturing operations. The case is so representative of the common production problems existing throughout industry that we propose not to modify the basic Sherman Motors case other than to change some of the terminology.

#### 6. Project Resource Allocation Case

This case will be a more applicable governmental problem of resource management where limited resources must be allocated in such a way as to maximize effectiveness or minimize operating costs in meeting some fixed demands on output productivity. The limited resources would include items such as funds, personnel, materials, and time. The variables would be units of output which would represent various tasks or services such as research, report writing, public information,

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contract administration, and including the objectives and missions of a federal agency. The coefficients of the constraint matrix would be derived from the productivity, or contribution, each resource has with respect to the unit of output. The case will be generalizable for actual application to similar problems within the governmental agency.

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